

the genetic constitution of these teosintes. Maize testers of the genotypes ga_1/ga_1 and Ga_1^S/Ga_1^S were kindly provided by Dr. O. E. Nelson of Purdue University. Seeds of teosintes were obtained from Professor P. C. Mangelsdorf of Harvard University. It was found that all of the teosintes (except Chilpancingo) possessed Ga_1 (Table 1). Its strength in Florida, Lake Retene, Huixta, Arcelia, Chalco and Xochimilco teosintes appeared stronger than ordinary Ga_1 , and it was subsequently designated as Ga_1^S .

Table 1. Results of the tests on the fourth chromosome gametophyte factors in Guatemalan (1-3) and Mexican teosintes ("x" indicates full seed set).

Teosinte	% seed set in X ga_1/ga_1	On Ga_1^S/Ga_1^S	Probable allele
1. Florida	0	x	Ga_1^S
2. Lake Retene	2	x	Ga_1^S
3. Huixta	0	x	Ga_1^S
4. Chilpancingo	0 (one plant set seed well)	x	Ga_1
5. Arcelia	0	x	Ga_1^S
6. Chalco	1.8	x	Ga_1^S
7. Xochimilco	7	x	Ga_1^S
8. Chapingo	24	x	Ga_1
9. Nobogame	25	x	Ga_1

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3. Meiosis in a haploid Ga_1^S tester plant.

In a test for the fourth chromosome male gametophyte factor in different varieties of teosinte, a haploid tester plant was identified among a total of 47 plants homozygous for Ga_1^S . At pachytene of the microsporocyte divisions of this haploid plant, univalents like those in the haploid maize - teosinte hybrid (M. G. N. L. 30: 21), always folded back on themselves. Pairing between heterologous chromosomes and univalents unpaired throughout their entire length were seldom observed. At diakinesis, most of the chromosomes remained as univalents. It appears that the amount of duplication for various segments among maize chromosomes is not large, if any.

At metaphase I, a total of 538 randomly chosen sporocytes was studied in polar view. The most frequently observed type of chromosome

association in a single cell was 10 univalents, which represented 44 percent of the total. The less frequently observed type of association was eight univalents plus one bivalent, which represented 41 percent of the total. The third type of association was six univalents plus two bivalents, which made up 15 percent. From metaphase I to anaphase I, unusual features of chromosome behaviour were as follows: (1) The spindles often appeared crescent-shaped and univalent chromosomes were often distributed over the entire cell area. Hence it seemed difficult to distinguish metaphase I from anaphase I. (2) If all of the 10 chromosomes by chance oriented at the equatorial plate, it was found that they were likely to split. (3) In some cells the univalent chromosomes did not split and they were randomly distributed to the two poles. The distributions of 1-9, 2-8, 3-7, 4-6, 5-5, were all observed. As expected, the latter two were the most frequently observed ways of distribution. However, 0-10 type of distribution was not found in a limited number of sporocytes studied. (4) The 10 chromosomes of certain sporocytes were no longer distinct but divided into several conglomerate chromatin masses. These masses scattered along the spindle. After telophase I, cytokinesis in many primary sporocytes was incomplete.

At the second meiotic division, the unsplit chromosomes from the previous division divided in the normal manner, while halves of the previous split chromosomes did not. The undividing chromosomes usually failed to congress at the equator at metaphase II. On the other hand, the dividing chromosomes tended to do so. Attenuated chromatin masses were sometimes formed at anaphase II. At tetrad stage, the phenomenon of multispory consistently appeared. Micronuclei were always present.

For a test of ovule fertility the first ear of this haploid plant was pollinated by a sib. About 15 percent of the female gametes were fertile and set well developed seeds, which is much higher than expected. This high fertility is probably due to the high frequency of natural chromosome doubling in the ovules.

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1. Further studies of perennialism in derivatives of Zea.

A. Tetraploids:

Studies carried on since 1956 indicate that the prosaic breeding procedure of sibbing among the most perennial segregates in the hybrid

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